Where large numbers of books have to be cared for, as in libraries, "silverfish" and cockroaches are, in this climate, the enemies perhaps most to be dreaded. These lurk and breed in the spaces between the woodwork and the walls, and in crevices and crannies about the shelves.

Mr. J. J. Fletcher, Secretary to the Linnean Society of N.S.W., has effectually rid the library of the Society of these pests by freely dusting into the crevices ordinary powdered Paris green. Wherever there was a space in which the insects could lurk, Mr. Fletcher applied the powder, and now the books, which were formerly much disfigured by the insects nibbling the bindings, remain entirely free from damage because of the extermination of the pests,

Thos. Steel.

Colonial Sugar Refinery Company, Sydney, January 31.

Radiation in a Magnetic Field.

In the very interesting summary of our present knowledge of the Zeeman effect, Mr. Preston has interpreted a number of results I obtained by the interferometer and the echelon spectroscope in such a way as to cast a general doubt over the performances of these instruments. Some of these interpretations are undoubtedly the result of misunderstandings due to my own want of clearness. I venture, therefore, to present a summary of the principal results, emphasising where necessary the points which require further explanation.

In the article to which Mr. Preston refers (*Phil. Mag.*, vol. xxxiv. p. 280, 1892), it was shown that the visibility curve, in the case of about twenty radiations examined, showed peculiarities from which the character of the spectrum could be inferred, and a considerable number of "lines" were shown to be double, triple, or more highly complex. Mr. Preston remarks: "This structure has never yet been observed by means of any ordinary form of spectroscope, and accordingly it has been suggested that it does not exist in the light radiated from the source, but is imposed on the spectral lines by the apparatus used, namely, the interferometer."

It might be replied that such an explanation would be very difficult to accept, in view of the very great constancy of the results, with instruments of different construction and dimensions, with different observers, and with different forms of vacuum tubes employed. But, if I am not mistaken, the only attempt at explanation of the peculiarities of my visibility curves, was that which attributes them to diffraction effects; which, however, would necessarily be of a totally different character, and indeed in most cases entirely insignificant.

The real reasons for the absence of confirmation of these results by the spectroscope are probably that the resolving power is insufficient; or where the resolving power is insufficient the radiating substance is not in a vacuum tube, and the consequent broadening of the lines under atmospheric pressure is so great as to mask the details of structure; or, finally, if the substance is placed in a vacuum tube, the light is not sufficiently bright.

Turning now to Mr. Preston's criticism of the results obtained in the investigation of the Zeeman effect, the following remarks may help to clear up the "most surprising statement that the separation of the lines in the triplets produced by the magnetic field is independent of both the spectral line and the substance."

The law referred to is stated thus: "The separation is proportional to the strength of field, and is *approximately* the same for all colours and for all substances."

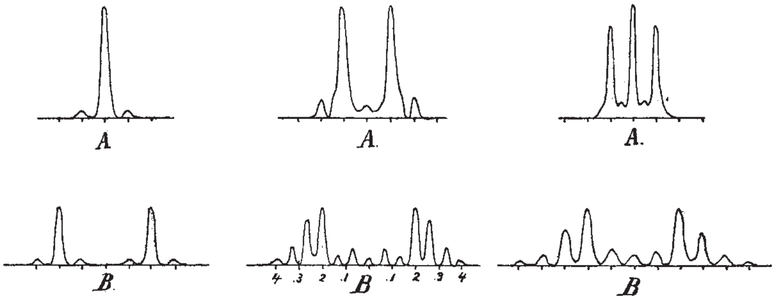
But on p. 137 of the same article (*Astrophysical Journal*, vol. vii. No. 2, 1898) will be found the further modification:

"The following table shows that the law . . . is only approximately true. In fact, owing to the complexity of the spectra, there is considerable latitude in the choice of the distance between the outer groups. If this correspond to the brightest components *the law can hardly be said to hold at all;* but if the distance be taken between the centres of gravity of the light areas, a fair agreement is found. The table gives separation in tenth-meters for a field 10,000. The lines marked with an asterisk are less accurate than the others on account of broadening:

*Hydrogen	...	Red	...	0·48
*Lithium	...	Red	...	0·60
Cadmium	...	Red	...	0·42
Zinc	...	Red	...	0·42
Mercury	...	Yellow	...	0·36
*Sodium	..	Yellow	...	0·50
*Helium	...	Green	...	0·37
Mercury	...	Green	...	0·40
Cadmium	...	Green	...	0·41
*Thallium	...	Green	...	0·36
Cadmium	...	Blue	...	0·40
Zinc	...	Blue	...	0·33
Mercury	...	Violet	...	0·33

"Taking into account the uncertainty alluded to, the results show on the whole a fair agreement, from which it may be concluded that the separation is independent of the radiating substance and of the colour."

A number of radiations have been examined since the foregoing was published; and while there are undoubted exceptions to the law, I still think, keeping in mind the limitations referred to, it is in the main correct.



Type I. Type II. Type III.

Fig. 1.—a, plane of polarisation, Equatorial.
b, ,, ,, Axial.

These results and others obtained by the interferometer, as Mr. Preston states, have been verified by the echelon spectroscope; and I think the explanation of apparent differences between results obtained by these methods and by other forms of spectroscope are to be explained, not by an actual variance, but by a misunderstanding of the degree of approximation the results are intended to show, except where the resolving power of the other spectroscopes is insufficient.

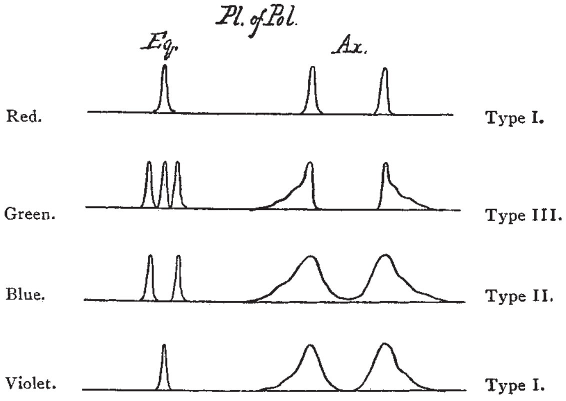


Fig. 2.

Mr. Preston states: "With apparatus which reveals structure or multiplicity in the ordinary spectral lines, it is to be expected that multiplicity would be readily revealed in the constituents produced by the magnetic field; yet in the case of some lines, the amount of finer structure revealed does not appear to be as great as that observed with a good grating. . . ." In reply to

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this statement, I would say that I know of no such instance. If there are cases of lines showing structure by the ordinary grating, which I do not mention, it is simply that my attention has not been directed to them, and I should venture to guarantee that if observed by either the interferometer or the echelon, they must show the same structure—or a finer.

I should have thought the tripling of the middle green line in the case of the green mercury and cadmium lines a matter of sufficient importance to add to those figured in Mr. Preston's paper.

To illustrate the preceding remarks, as well as to show the performance of the interferometer, I present a figure showing the three types of Zeeman effect, and another showing how these results are confirmed by the echelon.

It will be observed that there is an indication of structure in the outer lines, but at this time they had not actually been resolved. This has since been accomplished, as shown in the following figure :—

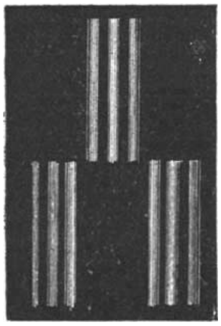

FIG. 3.

The following is a list of the radiations thus far examined, and their classifications according to these types :—

Mercury...	Yellow lines...	Type I.
	Green line	,, III.
	Violet line	,, II.
Cadmium	Red line	,, I.
	Green line	,, III.
	Blue line	,, II.
Zinc	Red line	,, I.
(? Cadmium)...	Green line	,, III.
	Blue line	,, II.
Sodium ...	Yellow lines...	,, II.
Thallium	Green line	,, II. (doubtful)
Lithium ...	Red line	Broadened.
[1]Hydrogen	Red line	Broadened.
Helium ...	Yellow line	Broadened.
	Green line	Type I.
Gold	Yellow line	,, II.
	Green line	,, I.
Silver	Yellow line	,, I.
	Green line	,, I.
[2]Copper ...	Yellow line	,, IV.
	Green lines	,, I.
Magnesium	Green line (5183)...	,, III.
	Green line (5172)...	,, II.
	Green line (5167)...	,, I.
[2]Manganese	Green line (5340)...	,, IV.
Argon	Red line	,, I.
Tin	Red line (6450)	,, II.
	Yellow line (5798)	,, I.
	Yellow line (5587)	,, I.
	Yellow line (5564)	,, I.
Iron	Most lines	,, I.
Carbon	Component lines of banded spectrum	Unaffected.

The University of Chicago Ryerson Physical Laboratory, Feb. 9.

A. A. MICHELSON.

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[1] Since this list was first published, decided indications of structure have been noticed, especially in the broadened middle line, which under favourable conditions appears as a group of six or seven very fine lines just resolvable, brightest at the centre, and extending through the entire space between the outer groups. Similar indications, though less distinct, were traced in the outer groups.

[2] Type IV. was added to include cases where a broad or complex line was simplified or narrowed in the magnetic field. This, as regards the copper line and the manganese line, is true of the central line of the triplet, and not (as might be inferred from the original paper) of the whole group.

Attraction in a Spherical Hollow.

THE theorem you published in your number of January 19, under the above head, may easily be deduced from the parallelogram of forces put in this form :

Let σa be intensity and direction of an attractive force, σb both for a repulsing force ; then the resultant of the two forces in σ will be parallel and equal to ba.

LANG.

Vienna, February 18.

THE REPORT OF THE SELECT COMMITTEE ON THE SCIENCE AND ART DEPARTMENT.

IN the course of last year the newspapers contained an account of the doings of the Select Committee of the House of Commons appointed to inquire into, and report upon, the administration of the Museums of the Science and Art Department. It was an open secret that some of the members of that Committee were bitterly opposed to the officials of the Department ; but however this might be, all evidence tending to throw discredit was very widely reported long before the Report was issued.

The Report of the Committee in due time made its appearance, and it has now been considered by the Lords of the Committee on Education. The result has been embodied in the shape of the following Minute, which has just been distributed among the Members of the House of Commons and others.

By the Right Honourable the Lords of the Committee of Her Majesty's most Honourable Privy Council on Education.

Present :—His Grace the Duke of Devonshire, K.G., Lord President of the Council ; the Right Hon. Sir John E. Gorst, M.P., Vice-President of the Committee of Council on Education.

(1) The Lords of the Committee of Council on Education consider the Second Report from the Select Committee of 1898 appointed to inquire into and report upon the administration and cost of the Museums of the Science and Art Department. My Lords have also before them the observations on this Report prepared in accordance with their instructions by the Secretary of the Science and Art Department, a copy of which is appended to this Minute.

(2) A reference to the proceedings of the Committee shows that pp. 1 to 16 of the Report are based upon the Chairman's draft. This part of the Report appears to contain a correct statement of facts, but it is followed by paragraphs, introduced as amendments, which traverse to a great extent the same ground, and contain many inaccuracies and some inconsistencies.

(3) Having regard to passages which appear to reflect on individual officers, My Lords desire to emphasise the fact that they alone are responsible to Parliament for the administration of the Museums, and to declare that their directions have been loyally carried out by the staff, and that they retain the fullest confidence in Sir John Donnelly and his colleagues.

(4) They regret that the Committee should have insinuated in their Report that officers have been appointed because of their relationship to members of the staff, and have been dismissed because of the evidence they gave to the Committee. Such insinuations are devoid of any foundation in fact.

By order of the Committee of Council on Education.

SCIENCE AT LIVERPOOL.

THE Lord Mayor of Liverpool is to be congratulated upon a new departure. The Municipal authorities of one of our most important cities have actually held high festival in honour of a man of science, the occasion being the award of the Rumford Medal to Prof. Lodge The Lord Mayor in the course of his speech said :

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